ISSN0511-5728
The West Indian Journal of Engineering
Vol.42, No.2, January 2020, pp.66-76

Investigating the Impact of Deformation on a 3D-printed Antenna in Biomedical Systems

Jeevan Persad[a] and Sean Rocke[b,Ψ]

Department of Electrical and Computer Engineering, The University of the West Indies, St. Augustine, Trinidad and Tobago, West Indies;

[a]Email: jeevan.persad.sta.uwi.edu
[b]Email: sean.rocke@sta.uwi.edu

[Ψ] *Corresponding Author*

(Received 29 April 2019; Revised 26 November 2019; Accepted 07 January 2020)

Abstract: *Recently, there has been increasing interest in using wearable sensors with flexible antennas. The antenna structures, which may be used for communications or for sensory elements, can possibly change their characteristics due to mechanical deformations. In this work, Radio frequency (RF) characteristics of a flexible Planar Inverted-F Antenna (PIFA) antenna intended for biomedical applications are explored. In the investigation, a traditional PIFA antenna structure on a Nylon substrate is considered. Using simulation studies, the flexible structure is subjected to various realistic mechanical deformations. Simulations facilitated investigation of the impact of the mechanical deformations on antenna performance, through consideration of the impact of flexibility on the reflection coefficient, transmission frequency and radiation patterns between 700MHz and 4GHz. Results demonstrated good stability on the antennas resonant frequency and physical resilience. However, increases in the reflection coefficient and the reach of the far-field as well as changes in the directionality of the antenna radiation pattern were observed as the antenna structure was pressed into the underlying tissue. These results provide valuable insights for those interested in deploying flexible antenna structures for wearable antenna and RF sensor applications.*

Keywords: *3D printing, antenna analysis, biosensor, body area networks, wearables*